Summary

In one general aspect, an EL display device includes a substrate on which an EL element is formed, a cover member, a filler for adhering said substrate on which the EL element is formed to said cover member, a sealing member for covering a side surface of said filler, and a frame member adhered with said sealing member.

In another general aspect, an EL display device includes an active matrix substrate on which a TFT and an EL element electrically connected with the TFT are formed, a cover member, a filler for adhering said active matrix substrate to said cover member, a sealing member for covering a side surface of said filler, and a frame member adhered with said sealing member.

In another general aspect, an EL display device includes a substrate on which an EL element composed of an anode arranged in a stripe, a cathode arranged in a stripe so as to be perpendicular to said anode, and an EL layer formed between said anode and said cathode, a cover member, a filler for adhering said substrate on which the EL element is formed to said cover member, a sealing member for covering a side surface of said filler, and a frame member adhered with said sealing member.

Implementations of the EL display devices may include one or more the following features. For example, the EL display devices may include a drying agent in the filler. The drying agent may include barium oxide. The drying agent may have a granular shape with an average diameter of 100 μmØ, and a density of 1×10^2 to 1×10^5 atoms/cm^3. The cover member may be provided with a light shielding film or color filter. An electronic device and/or a portable telephone may include the EL display devices in a display portion thereof.

An object of the present invention is to provide an EL display device with high reliability. Further, another object of the present invention is to provide an electronic device using such an EL display device with high reliability as its display portion.

Description of the Drawings

Fig. 1A is a side view of an EL display device without a sealing structure.

Fig. 1B is a side view of the EL display device of Fig. 1B with a sealing structure.

Fig. 2A is a cross-sectional side view of the EL display device of Fig. 1B taken along section lines A-A'

Fig. 2B is a cross-sectional side view of the EL display device of Fig. 1B taken along section lines B-B'.

Fig. 3 is a cross-section side view of an EL display device.

Fig. 4 is a plan view of a bonding apparatus of a double vacuum system.

Fig. 5 is a cross-sectional side view of an EL display device in which a PVF film is used as a cover member.

Fig. 6 is a cross-sectional side view of a simple matrix EL display device having a cover member.

Fig. 7 is a cross-sectional side view of a simple matrix EL display device.

Fig. 8A is a perspective view of an EL display.

Fig. 8B is a perspective view of an EL display implemented in a video camera.

Fig. 8C is a perspective view of an EL display implemented as a head mounted display.

Fig. 8D is a perspective view of an EL display implemented in a DVD playback device.

Fig. 8E is a perspective view of an EL display implemented in a device with a camera and a display portion.

Fig. 8F is a perspective view of an EL display implemented in a portable computer.

Fig. 9A is a perspective view of a portable telephone in which the EL display has been incorporated.

Fig. 9B is a perspective view of a car audio system in which the EL display has been incorporated.

Please amend paragraph [0005] as follows:

Detailed Description

A structure of the present invention is explained with reference to Fig. 1. Fig. 1A shows an EL display device of the present invention in a state that a sealing structure for sealing an EL element in a sealing space is not provided.

Please amend paragraph [0022] as follows:

Embodiment mode of the present invention is explained with reference to Fig. 3. Fig. 3 is a cross-sectional view of an EL display device of the present invention. Note that the basic structure is the same as Fig. 2A, and thus, the explanation is made as the need arises.

Please amend paragraph [0037] as follows:

Embodiments

Embodiment 1

In this embodiment, an example of using a PVF film as a cover member is shown in Fig. 5. In Fig. 5, reference numeral 501 indicates a light transmitting substrate (a plastic substrate in this embodiment), 502 indicates a pixel portion, 503 indicates a driver circuit, and the respective portions are formed of TFTs. Besides, an EL element 504 is formed in the pixel portion 502, and image display is performed.

Please amend paragraph [0040] as follows:

Embodiment 2

In this embodiment, an example of implementing the present invention in a simple matrix EL display device is shown in Fig. 6. In Fig. 6, reference numeral 601 indicates a plastic substrate, and reference numeral 602 indicates a cathode with a lamination structure of an aluminum film and a lithium fluoride film (the lithium fluoride film corresponds to the portion contacting an EL layer). In this embodiment, the cathode 602 is formed by an evaporation method. Note that, although not shown in Fig. 6, a plurality of cathodes is arranged in stripe in a direction perpendicular to the paper.

Please amend paragraph [0048] as follows:

Embodiment 3

In this embodiment, an example of implementing the present invention in a simple matrix EL display device is shown in Fig. 7. In Fig. 7, reference numeral 701 indicates a glass substrate, and reference numeral 702 indicates an anode made of a transparent conductive film. In this embodiment, a compound of indium oxide and tin oxide is formed by a sputtering method. Note that, although not shown in Fig. 7, a plurality of anodes is arranged in stripe in a direction perpendicular to the paper.

Please amend paragraph [0055] as follows:

Embodiment 4